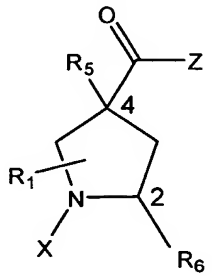
Amendments to the Claims:

The listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (currently amended): A bis-amino acid compound having the formula



(1)

where:

X represents a first amine protecting group that is different from Y, wherein the first amine protecting group is selected from the group consisting of 9-fluorenylmethyl carbamate, allyl carbamate, benzyl carbamate, substituted benzyl carbamate, t-butyl carbamate, 1-adamantyl carbamate, 2-nitrobenzenesulfonyl, triphenylmethyl, (4-methoxyphenyl)diphenylmethyl, and 9-phenylfluorenyl;

Y represents a second amine protecting group that is different from X, wherein the second amine protecting group is selected from the group consisting of 9-fluorenylmethyl carbamate, allyl carbamate, benzyl carbamate, substituted benzyl carbamate, t-butyl carbamate, 1-adamantyl carbamate, 2-nitrobenzenesulfonyl, triphenylmethyl, (4-methoxyphenyl)diphenylmethyl, and 9-phenylfluorenyl;

Z represents a weak leaving group selected from the group consisting of short chain alkoxides, thiolates, azide, and sulfonamides;

R_1 represents an H and can be attached to the molecule at positions 2, 3 or 5;

R_5 represents N_3 or –NH-Y;

R_6 represents a carboxylic acid; and

the stereochemical configuration at positions 2 and 4 is selected from the group consisting of (R,R), (R,S), (S,R), and (S,S);

wherein said compound provides bis-amino acid molecular building blocks that can be linked together through the formation of rigid diketopiperazine rings to create spiro-ladder oligomers containing at least two bis-amino acids.

Claims 2-3 (canceled).

Claim 4 (original): The compound of Claim 1, wherein Z is OMe.

Claim 5 (previously presented): The compound of Claim 1, wherein X is selected from the group consisting of benzyl-carbamate and t-butyl carbamate.

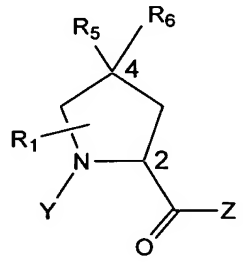
Claim 6 (original): The compound of Claim 1, wherein Y is 2-nitrobenzenesulfonamide.

Claim 7 (original): The compound of Claim 1, wherein Y is 9-fluoroenylmethylcarbamate.

Claim 8 (previously presented): The compound of Claim 1, wherein X is benzylcarbamate, R_5 is –NH-Y, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

Claims 9-12 (canceled).

13. (withdrawn) A compound having the formula



(2)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3 or 5;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2X;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at positions 2 and 4 and of the carbon bearing R_1 (if R_1 is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S), (R,S,R), (R,R,S) or (R,R,R).

14. (withdrawn) (withdrawn) The compound of Claim 13, wherein R_5 is N_3.

15. (withdrawn) The compound of Claim 13, wherein R_5 is NR_2X.

16. (withdrawn) The compound of Claim 13, wherein Z is OMe.

17. (withdrawn) The compound of Claim 13, wherein X is benzylcarbamate.

18. (withdrawn) The compound of Claim 13, wherein Y is 2-nitrobenzenesulfonamide.

19. (withdrawn) The compound of Claim 13, wherein Y is 9-fluoroenylmethylcarbamate.

20. (withdrawn) The compound of Claim 13, wherein X is benzylcarbamate, R_5 is NR_2X, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

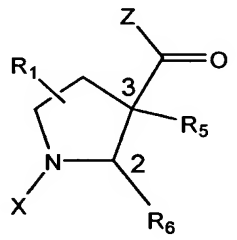
21. (withdrawn) The compound of Claim 13, wherein R_1 is an alkene.

22. (withdrawn) The compound of Claim 13, wherein R_1 is a protected carboxylate.

23. (withdrawn) The compound of Claim 13, wherein R_1 is a protected alcohol.

24. (withdrawn) The compound of Claim 13, wherein R_1 is a protected thiol.

25. (withdrawn) A compound having the formula



(3)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 4 or 5;

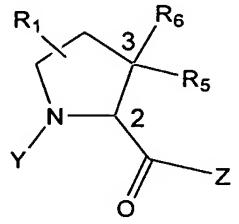
R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2Y;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at positions 2 and 3 and of the carbon bearing R_1 (if R_1 is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S), (R,S,R), (R,R,S) or (R,R,R).

26. (withdrawn) The compound of Claim 25, wherein R_5 is N_3.
27. (withdrawn) The compound of Claim 25, wherein R_5 is NR_2Y.
28. (withdrawn) The compound of Claim 25, wherein Z is OMe.
29. (withdrawn) The compound of Claim 25, wherein X is benzylcarbamate.
30. (withdrawn) The compound of Claim 25, wherein Y is 2-nitrobenzenesulfonamide.
31. (withdrawn) The compound of Claim 25, wherein Y is 9-fluoroenylmethylcarbamate.
32. (withdrawn) The compound of Claim 25, wherein X is benzylcarbamate, R_5 is NR_2Y, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.
33. (withdrawn) The compound of Claim 25, wherein R_1 is an alkene.
34. (withdrawn) The compound of Claim 25, wherein R_1 is a protected carboxylate.
35. (withdrawn) The compound of Claim 25, wherein R_1 is a protected alcohol.
36. (withdrawn) The compound of Claim 25, wherein R_1 is a protected thiol.
37. (withdrawn) A compound having the formula



(4)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 4 or 5;

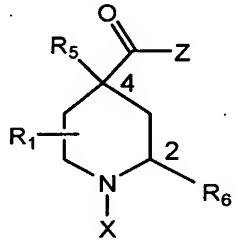
R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2X;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at positions 2 and 3 and of the carbon bearing R_1 (if R_1 is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S), (R,S,R), (R,R,S) or (R,R,R).

38. (withdrawn) The compound of Claim 37, wherein R_5 is N_3.
39. (withdrawn) The compound of Claim 37, wherein R_5 is NR_2X.
40. (withdrawn) The compound of Claim 37, wherein Z is OMe.
41. (withdrawn) The compound of Claim 37, wherein X is benzylcarbamate.
42. (withdrawn) The compound of Claim 37, wherein Y is 2-nitrobenzenesulfonamide.
43. (withdrawn) The compound of Claim 37, wherein Y is 9-fluoroenylmethylcarbamate.
44. (withdrawn) The compound of Claim 37, wherein X is benzylcarbamate, R_5 is NR_2X, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.
45. (withdrawn) The compound of Claim 37, wherein R_1 is an alkene.
46. (withdrawn) The compound of Claim 37, wherein R_1 is a protected carboxylate.
47. (withdrawn) The compound of Claim 37, wherein R_1 is a protected alcohol.
48. (withdrawn) The compound of Claim 37, wherein R_1 is a protected thiol.
49. (withdrawn) A compound having the formula



(5)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 5 or 6;

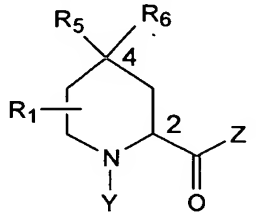
R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2Y;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at positions 2 and 4 and of the carbon bearing R_1 (if R_1 is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S), (R,S,R), (R,R,S) or (R,R,R).

50. (withdrawn) The compound of Claim 49, wherein R_5 is N_3.
51. (withdrawn) The compound of Claim 49, wherein R_5 is NR_2Y.
52. (withdrawn) The compound of Claim 49, wherein Z is OMe.
53. (withdrawn) The compound of Claim 49, wherein X is benzylcarbamate.
54. (withdrawn) The compound of Claim 49, wherein Y is 2-nitrobenzenesulfonamide.
55. (withdrawn) The compound of Claim 49, wherein Y is 9-fluoroenylmethylcarbamate.
56. (withdrawn) The compound of Claim 49, wherein X is benzylcarbamate, R_5 is NR_2Y, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.
57. (withdrawn) The compound of Claim 49, wherein R_1 is an alkene.
58. (withdrawn) The compound of Claim 49, wherein R_1 is a protected carboxylate.
59. (withdrawn) The compound of Claim 49, wherein R_1 is a protected alcohol.
60. (withdrawn) The compound of Claim 49, wherein R_1 is a protected thiol.
61. (withdrawn) A compound having the formula



(6)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 5 or 6;

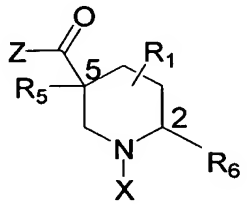
R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2X;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at positions 2 and 4 and of the carbon bearing R_1 (if R_1 is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S), (R,S,R), (R,R,S) or (R,R,R).

62. (withdrawn) The compound of Claim 61, wherein R_5 is N_3.
63. (withdrawn) The compound of Claim 61, wherein R_5 is NR_2X.
64. (withdrawn) The compound of Claim 61, wherein Z is OMe.
65. (withdrawn) The compound of Claim 61, wherein X is benzylcarbamate.
66. (withdrawn) The compound of Claim 61, wherein Y is 2-nitrobenzenesulfonamide.
67. (withdrawn) The compound of Claim 61, wherein Y is 9-fluoroenylmethylcarbamate.
68. (withdrawn) The compound of Claim 61, wherein X is benzylcarbamate, R_5 is NR_2X, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.
69. (withdrawn) The compound of Claim 61, wherein R_1 is an alkene.
70. (withdrawn) The compound of Claim 61, wherein R_1 is a protected carboxylate.
71. (withdrawn) The compound of Claim 61, wherein R_1 is a protected alcohol.
72. (withdrawn) The compound of Claim 61, wherein R_1 is a protected thiol.
73. (withdrawn) A compound having the formula



(7)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4 or 6;

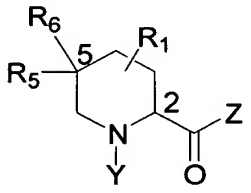
R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2Y;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at positions 2 and 5 and of the carbon bearing R_1 (if R_1 is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S), (R,S,R), (R,R,S) or (R,R,R).

74. (withdrawn) The compound of Claim 73, wherein R_5 is N_3.
75. (withdrawn) The compound of Claim 73, wherein R_5 is NR_2Y.
76. (withdrawn) The compound of Claim 73, wherein Z is OMe.
77. (withdrawn) The compound of Claim 73, wherein X is benzylcarbamate.
78. (withdrawn) The compound of Claim 73, wherein Y is 2-nitrobenzenesulfonamide.
79. (withdrawn) The compound of Claim 73, wherein Y is 9-fluoroenylmethylcarbamate.
80. (withdrawn) The compound of Claim 73, wherein X is benzylcarbamate, R_5 is NR_2Y, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.
81. (withdrawn) The compound of Claim 73, wherein R_1 is an alkene.
82. (withdrawn) The compound of Claim 73, wherein R_1 is a protected carboxylate.
83. (withdrawn) The compound of Claim 73, wherein R_1 is a protected alcohol.
84. (withdrawn) The compound of Claim 73, wherein R_1 is a protected thiol.
85. (withdrawn) A compound having the formula



(8)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 5 or 6;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2X;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at positions 2 and 5 and of the carbon bearing R_1 (if R_1 is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S), (R,S,R), (R,R,S) or (R,R,R).

86. (withdrawn) The compound of Claim 85, wherein R_5 is N_3.

87. (withdrawn) The compound of Claim 85, wherein R_5 is NR_2X.

88. (withdrawn) The compound of Claim 85, wherein Z is OMe.

89. (withdrawn) The compound of Claim 85, wherein X is benzylcarbamate.

90. (withdrawn) The compound of Claim 85, wherein Y is 2-nitrobenzenesulfonamide.

91. (withdrawn) The compound of Claim 85, wherein Y is 9-fluoroenylmethylcarbamate.

92. (withdrawn) The compound of Claim 85, wherein X is benzylcarbamate, R_5 is NR_2X, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

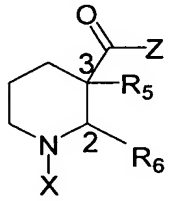
93. (withdrawn) The compound of Claim 85, wherein R_1 is an alkene.

94. (withdrawn) The compound of Claim 85, wherein R_1 is a protected carboxylate.

95. (withdrawn) The compound of Claim 85, wherein R_1 is a protected alcohol.

96. (withdrawn) The compound of Claim 85, wherein R_1 is a protected thiol.

97. (withdrawn) A compound having the formula



(9)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 4, 5 or 6;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2Y;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at positions 2 and 3 and of the carbon bearing R_1 (if R_1 is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S), (R,S,R), (R,R,S) or (R,R,R).

98. (withdrawn) The compound of Claim 97, wherein R_5 is N_3.

99. (withdrawn) The compound of Claim 97, wherein R_5 is NR_2Y.

100. (withdrawn) The compound of Claim 97, wherein Z is OMe.

101. (withdrawn) The compound of Claim 97, wherein X is benzylcarbamate.

102. (withdrawn) The compound of Claim 97, wherein Y is 2-nitrobenzenesulfonamide.

103. (withdrawn) The compound of Claim 97, wherein Y is 9-fluoroenylmethylcarbamate.

104. (withdrawn) The compound of Claim 97, wherein X is benzylcarbamate, R_5 is NR_2Y, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

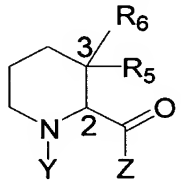
105. (withdrawn) The compound of Claim 97, wherein R_1 is an alkene.

106. (withdrawn) The compound of Claim 97, wherein R_1 is a protected carboxylate.

107. (withdrawn) The compound of Claim 97, wherein R_1 is a protected alcohol.

108. (withdrawn) The compound of Claim 97, wherein R_1 is a protected thiol.

109. (withdrawn) A compound having the formula



(10)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 4, 5 or 6;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2X;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at positions 2 and 3 and of the carbon bearing R_1 (if R_1 is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S), (R,S,R), (R,R,S) or (R,R,R).

110. (withdrawn) The compound of Claim 109, wherein R_5 is N_3.

111. (withdrawn) The compound of Claim 109, wherein R_5 is NR_2X.

112. (withdrawn) The compound of Claim 109, wherein Z is OMe.

113. (withdrawn) The compound of Claim 109, wherein X is benzylcarbamate.

114. (withdrawn) The compound of Claim 109, wherein Y is 2-nitrobenzenesulfonamide.

115. (withdrawn) The compound of Claim 109, wherein Y is 9-fluoroenylmethylcarbamate.

116. (withdrawn) The compound of Claim 109, wherein X is benzylcarbamate, R_5 is NR_2X, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

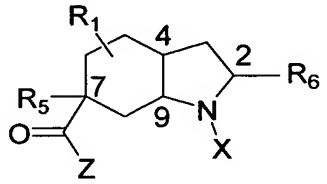
117. (withdrawn) The compound of Claim 109, wherein R_1 is an alkene.

118. (withdrawn) The compound of Claim 109, wherein R_1 is a protected carboxylate.

119. (withdrawn) The compound of Claim 109, wherein R_1 is a protected alcohol.

120. (withdrawn) The compound of Claim 109, wherein R_1 is a protected thiol.

121. (withdrawn) A compound having the formula



(11)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4, 5, 6, 8 or 9;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2Y;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at positions 2, 4, 7, 9 and of the carbon bearing R_1 (if R_1 is not H) can be any of the 32 combinations of (R) and (S).

122. (withdrawn) The compound of Claim 121, wherein R_5 is N_3.

123. (withdrawn) The compound of Claim 121, wherein R_5 is NR_2Y.

124. (withdrawn) The compound of Claim 121, wherein Z is OMe.

125. (withdrawn) The compound of Claim 121, wherein X is benzylcarbamate.

126. (withdrawn) The compound of Claim 121, wherein Y is 2-nitrobenzenesulfonamide.

127. (withdrawn) The compound of Claim 121, wherein Y is 9-fluoroenylmethylcarbamate.

128. (withdrawn) The compound of Claim 121, wherein X is benzylcarbamate, R_5 is NR_2Y, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

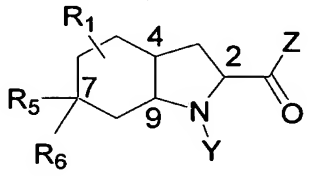
129. (withdrawn) The compound of Claim 121, wherein R_1 is an alkene.

130. (withdrawn) The compound of Claim 121, wherein R_1 is a protected carboxylate.

131. (withdrawn) The compound of Claim 121, wherein R_1 is a protected alcohol.

132. (withdrawn) The compound of Claim 121, wherein R_1 is a protected thiol.

133. (withdrawn) A compound having the formula



(12)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4, 5, 6, 8 or 9;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2X;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at positions 2, 4, 7, 9 and of the carbon bearing R_1 (if R_1 is not H) can be any of the 32 combinations of (R) and (S).

134. (withdrawn) The compound of Claim 133, wherein R_5 is N_3.

135. (withdrawn) The compound of Claim 133, wherein R_5 is NR_2X.

136. (withdrawn) The compound of Claim 133, wherein Z is OMe.

137. (withdrawn) The compound of Claim 133, wherein X is benzylcarbamate.

138. (withdrawn) The compound of Claim 133, wherein Y is 2-nitrobenzenesulfonamide.

139. (withdrawn) The compound of Claim 133, wherein Y is 9-fluoroenylmethylcarbamate.

140. (withdrawn) The compound of Claim 133, wherein X is benzylcarbamate, R_5 is NR_2X, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

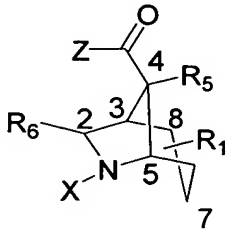
141. (withdrawn) The compound of Claim 133, wherein R_1 is an alkene.

142. (withdrawn) The compound of Claim 133, wherein R_1 is a protected carboxylate.

143. (withdrawn) The compound of Claim 133, wherein R_1 is a protected alcohol.

144. (withdrawn) The compound of Claim 133, wherein R_1 is a protected thiol.

145. (withdrawn) A compound having the formula



(13)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 5, 6, 7 or 8;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2Y;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at the positions 2, 3, 4 and 5, and of the carbon bearing R_1 (if R_1 is not H) can be any of the 32 combinations of (R) and (S).

146. (withdrawn) The compound of Claim 145, wherein R_5 is N_3.

147. (withdrawn) The compound of Claim 145, wherein R_5 is NR_2Y.

148. (withdrawn) The compound of Claim 145, wherein Z is OMe.

149. (withdrawn) The compound of Claim 145, wherein X is benzylcarbamate.

150. (withdrawn) The compound of Claim 145, wherein Y is 2-nitrobenzenesulfonamide.

151. (withdrawn) The compound of Claim 145, wherein Y is 9-fluoroenylmethylcarbamate.

152. (withdrawn) The compound of Claim 145, wherein X is benzylcarbamate, R_5 is NR_2Y, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

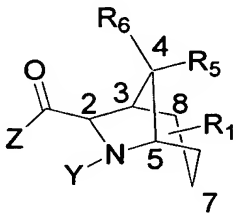
153. (withdrawn) The compound of Claim 145, wherein R_1 is an alkene.

154. (withdrawn) The compound of Claim 145, wherein R_1 is a protected carboxylate.

155. (withdrawn) The compound of Claim 145, wherein R_1 is a protected alcohol.

156. (withdrawn) The compound of Claim 145, wherein R_1 is a protected thiol.

157. (withdrawn) A compound having the formula



(14)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 5, 6, 7 or 8;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2X;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at the positions 2, 3, 4 and 5, and of the carbon bearing R_1 (if R_1 is not H) can be any of the 32 combinations of (R) and (S).

158. (withdrawn) The compound of Claim 157, wherein R_5 is N_3.

159. (withdrawn) The compound of Claim 157, wherein R_5 is NR_2X.

160. (withdrawn) The compound of Claim 157, wherein Z is OMe.

161. (withdrawn) The compound of Claim 157, wherein X is benzylcarbamate.

162. (withdrawn) The compound of Claim 157, wherein Y is 2-nitrobenzenesulfonamide.

163. (withdrawn) The compound of Claim 157, wherein Y is 9-fluoroenylmethylcarbamate.

164. (withdrawn) The compound of Claim 157, wherein X is benzylcarbamate, R_5 is NR_2X, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

165. (withdrawn) The compound of Claim 157, wherein R_1 is an alkene.

166. (withdrawn) The compound of Claim 157, wherein R_1 is a protected carboxylate.

167. (withdrawn) The compound of Claim 157, wherein R_1 is a protected alcohol.

168. (withdrawn) The compound of Claim 157, wherein R_1 is a protected thiol.

169. (withdrawn) A method of synthesizing *bis* peptides comprising the steps of:

1) providing a solid support;

2) activating a first *bis* amino acid or naturally occurring amino acid;

3) attaching the *bis* amino acid or naturally occurring amino acid to the support;

4) removing the leading edge amine protecting group if a *bis* amino acid is used, or the amine protecting group if a naturally occurring amino acid is used;

5) activating and attaching a next *bis* amino acid or a next naturally occurring amino acid to the leading edge amine of the *bis* amino acid or amine of the naturally occurring amino acid; and

6) repeating steps 4 and 5 as necessary to achieve the desired chain length;

7) detaching the synthesized *bis* peptide from the support; and

8) isolating the synthesized *bis* peptide,

where the *bis* peptide synthesized in the above manner has at least two contiguous *bis* amino acids, and a rigidification step is carried out either after step 4 or after detachment of the *bis* peptide from the solid support.

170. (withdrawn) The method of Claim 169, further comprising the step of modifiying or adding a functional group, after step 5.

171. (withdrawn) A method of synthesizing *bis* peptides comprising the steps of:

1) providing a *bis*-amino acid or *bis*-peptide fragment containing a mixture of *bis*-amino acid and naturally occurring amino acid with an unprotected leading edge amine and a protected trailing edge carboxylic acid;

2) providing a *bis*-s or *bis*-peptide fragment containing a mixture of *bis*-amino acid and naturally occurring amino acids with a protected leading edge amine and an activated ester;

3) coupling the two fragments in solution;

4) isolating the synthesized *bis*-peptide;

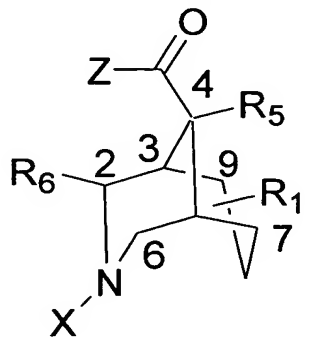
5) removing the leading edge amine protecting group or the trailing end carboxylic acid protecting group; and

6) repeating steps 1,2,3,4 to achieve the desired chain length;

where the *bis* peptide synthesized in the above manner has at least two contiguous *bis* amino acids, and a rigidification step is carried out either after step 3 or after detachment of the *bis* peptide from the solid support.

172. (withdrawn) The method of Claim 171, further comprising the step of modifiying or adding a functional group, after step 3.

173. (withdrawn) A compound having the formula



(15)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 5, 6, 7, 8 or 9;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2Y;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at the positions 2, 3, 4 and 5, and of the carbon bearing R_1 (if R_1 is not H) can be any of the 32 combinations of (R) and (S).

174. (withdrawn) The compound of Claim 173, wherein R_5 is N_3.

175. (withdrawn) The compound of Claim 173, wherein R_5 is NR_2Y.

176. (withdrawn) The compound of Claim 173, wherein Z is OMe.

177. (withdrawn) The compound of Claim 173, wherein X is benzylcarbamate.

178. (withdrawn) The compound of Claim 173, wherein Y is 2-nitrobenzenesulfonamide.

179. (withdrawn) The compound of Claim 173, wherein Y is 9-fluoroenylmethylcarbamate.

180. (withdrawn) The compound of Claim 173, wherein X is benzylcarbamate, R_5 is NR_2Y, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

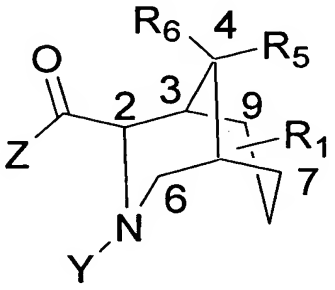
181. (withdrawn) The compound of Claim 173, wherein R_1 is an alkene.

182. (withdrawn) The compound of Claim 173, wherein R_1 is a protected carboxylate.

183. (withdrawn) The compound of Claim 173, wherein R_1 is a protected alcohol.

184. (withdrawn) The compound of Claim 173, wherein R_1 is a protected thiol.

185. (withdrawn) A compound having the formula



(16)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 5, 6, 7, 8 or 9;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2X;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at the positions 2, 3, 4 and 5, and of the carbon bearing R_1 (if R_1 is not H) can be any of the 32 combinations of (R) and (S).

186. (withdrawn) The compound of Claim 185, wherein R_5 is N_3.

187. (withdrawn) The compound of Claim 185, wherein R_5 is NR_2X.

188. (withdrawn) The compound of Claim 185, wherein Z is OMe.

189. (withdrawn) The compound of Claim 185, wherein X is benzylcarbamate.

190. (withdrawn) The compound of Claim 185, wherein Y is 2-nitrobenzenesulfonamide.

191. (withdrawn) The compound of Claim 185, wherein Y is 9-fluoroenylmethylcarbamate.

192. (withdrawn) The compound of Claim 185, wherein X is benzylcarbamate, R_5 is NR_2X, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

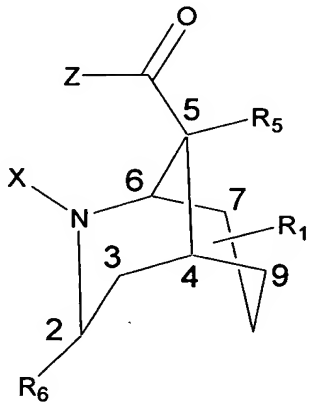
193. (withdrawn) The compound of Claim 185, wherein R_1 is an alkene.

194. (withdrawn) The compound of Claim 185, wherein R_1 is a protected carboxylate.

195. (withdrawn) The compound of Claim 185, wherein R_1 is a protected alcohol.

196. (withdrawn) The compound of Claim 185, wherein R_1 is a protected thiol.

197. (withdrawn) A compound having the formula



(17)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4, 6, 7, 8 or 9;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2Y;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at the positions 2, 4, 5 and 6, and of the carbon bearing R_1 (if R_1 is not H) can be any of the 32 combinations of (R) and (S).

198. (withdrawn) The compound of Claim 197, wherein R_5 is N_3.

199. (withdrawn) The compound of Claim 197, wherein R_5 is NR_2Y.

200. (withdrawn) The compound of Claim 197, wherein Z is OMe.

201. (withdrawn) The compound of Claim 197, wherein X is benzylcarbamate.

202. (withdrawn) The compound of Claim 197, wherein Y is 2-nitrobenzenesulfonamide.

203. (withdrawn) The compound of Claim 197, wherein Y is 9-fluoroenylmethylcarbamate.

204. (withdrawn) The compound of Claim 197, wherein X is benzylcarbamate, R_5 is NR_2Y, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

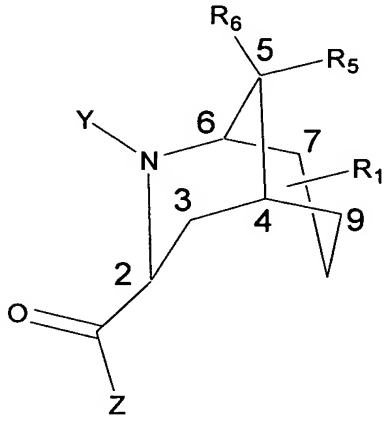
205. (withdrawn) The compound of Claim 197, wherein R_1 is an alkene.

206. (withdrawn) The compound of Claim 197, wherein R_1 is a protected carboxylate.

207. (withdrawn) The compound of Claim 197, wherein R_1 is a protected alcohol.

208. (withdrawn) The compound of Claim 197, wherein R_1 is a protected thiol.

209. (withdrawn) A compound having the formula



(18)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4, 6, 7, 8 or 9;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2X;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at the positions 2, 4, 5 and 6, and of the carbon bearing R_1 (if R_1 is not H) can be any of the 32 combinations of (R) and (S).

210. (withdrawn) The compound of Claim 209, wherein R_5 is N_3.

211. (withdrawn) The compound of Claim 209, wherein R_5 is NR_2X.

212. (withdrawn) The compound of Claim 209, wherein Z is OMe.

213. (withdrawn) The compound of Claim 209, wherein X is benzylcarbamate.

214. (withdrawn) The compound of Claim 209, wherein Y is 2-nitrobenzenesulfonamide.

215. (withdrawn) The compound of Claim 209, wherein Y is 9-fluoroenylmethylcarbamate.

216. (withdrawn) The compound of Claim 209, wherein X is benzylcarbamate, R_5 is NR_2X, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

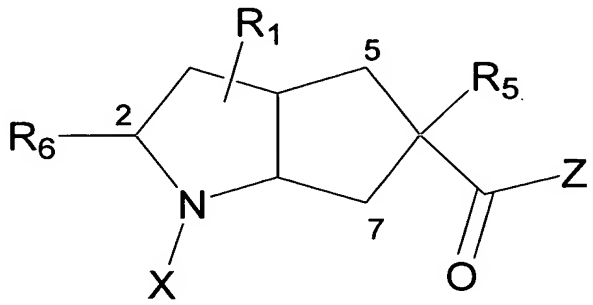
217. (withdrawn) The compound of Claim 209, wherein R_1 is an alkene.

218. (withdrawn) The compound of Claim 209, wherein R_1 is a protected carboxylate.

219. (withdrawn) The compound of Claim 209, wherein R_1 is a protected alcohol.

220. (withdrawn) The compound of Claim 209, wherein R_1 is a protected thiol.

221. (withdrawn) A compound having the formula



(19)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4, 5, 7 or 8;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2Y;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at the positions 2, 4, 6 and 8, and of the carbon bearing R_1 (if R_1 is not H) can be any of the 32 combinations of (R) and (S).

222. (withdrawn) The compound of Claim 221, wherein R_5 is N_3.

223. (withdrawn) The compound of Claim 221, wherein R_5 is NR_2Y.

224. (withdrawn) The compound of Claim 221, wherein Z is OMe.

225. (withdrawn) The compound of Claim 221, wherein X is benzylcarbamate.

226. (withdrawn) The compound of Claim 221, wherein Y is 2-nitrobenzenesulfonamide.

227. (withdrawn) The compound of Claim 221, wherein Y is 9-fluoroenylmethylcarbamate.

228. (withdrawn) The compound of Claim 221, wherein X is benzylcarbamate, R_5 is NR_2Y, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

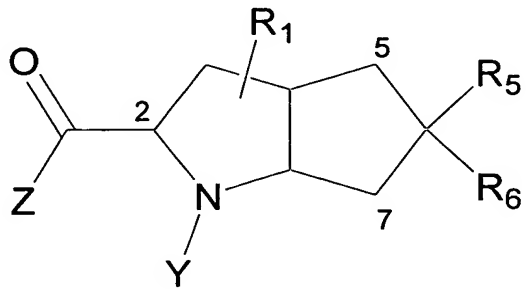
229. (withdrawn) The compound of Claim 221, wherein R_1 is an alkene.

230. (withdrawn) The compound of Claim 221, wherein R_1 is a protected carboxylate.

231. (withdrawn) The compound of Claim 221, wherein R_1 is a protected alcohol.

232. (withdrawn) The compound of Claim 221, wherein R_1 is a protected thiol.

233. (withdrawn) A compound having the formula



(20)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4, 5, 7 or 8;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2X;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at the positions 2, 4, 6 and 8, and of the carbon bearing R_1 (if R_1 is not H) can be any of the 32 combinations of (R) and (S).

234. (withdrawn) The compound of Claim 233, wherein R_5 is N_3.

235. (withdrawn) The compound of Claim 233, wherein R_5 is NR_2X.

236. (withdrawn) The compound of Claim 233, wherein Z is OMe.

237. (withdrawn) The compound of Claim 233, wherein X is benzylcarbamate.

238. (withdrawn) The compound of Claim 233, wherein Y is 2-nitrobenzenesulfonamide.

239. (withdrawn) The compound of Claim 233, wherein Y is 9-fluoroenylmethylcarbamate.

240. (withdrawn) The compound of Claim 233, wherein X is benzylcarbamate, R_5 is NR_2X, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

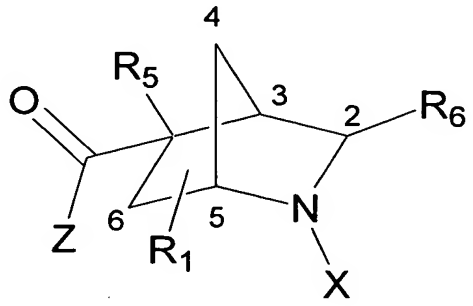
241. (withdrawn) The compound of Claim 233, wherein R_1 is an alkene.

242. (withdrawn) The compound of Claim 233, wherein R_1 is a protected carboxylate.

243. (withdrawn) The compound of Claim 233, wherein R_1 is a protected alcohol.

244. (withdrawn) The compound of Claim 233, wherein R_1 is a protected thiol.

245. (withdrawn) A compound having the formula



(21)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4, 5 or 6;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2Y;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at the positions 2, 3, 5 and 7, and of the carbon bearing R_1 (if R_1 is not H) can be any of the 32 combinations of (R) and (S).

246. (withdrawn) The compound of Claim 245, wherein R_5 is N_3.

247. (withdrawn) The compound of Claim 245, wherein R_5 is NR_2Y.

248. (withdrawn) The compound of Claim 245, wherein Z is OMe.

249. (withdrawn) The compound of Claim 245, wherein X is benzylcarbamate.

250. (withdrawn) The compound of Claim 245, wherein Y is 2-nitrobenzenesulfonamide.

251. (withdrawn) The compound of Claim 245, wherein Y is 9-fluoroenylmethylcarbamate.

252. (withdrawn) The compound of Claim 245, wherein X is benzylcarbamate, R_5 is NR_2Y, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

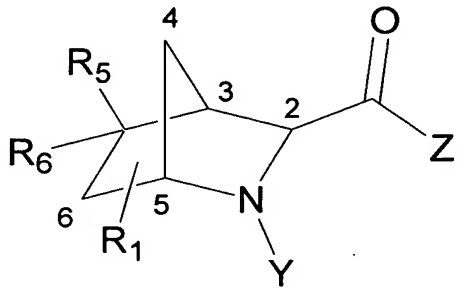
253. (withdrawn) The compound of Claim 245, wherein R_1 is an alkene.

254. (withdrawn) The compound of Claim 245, wherein R_1 is a protected carboxylate.

255. (withdrawn) The compound of Claim 245, wherein R_1 is a protected alcohol.

256. (withdrawn) The compound of Claim 245, wherein R_1 is a protected thiol.

257. (withdrawn) A compound having the formula



(22)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4, 5 or 6;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2X;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at the positions 2, 3, 5 and 7, and of the carbon bearing R_1 (if R_1 is not H) can be any of the 32 combinations of (R) and (S).

258. (withdrawn) The compound of Claim 257, wherein R_5 is N_3.

259. (withdrawn) The compound of Claim 257, wherein R_5 is NR_2X.

260. (withdrawn) The compound of Claim 257, wherein Z is OMe.

261. (withdrawn) The compound of Claim 257, wherein X is benzylcarbamate.

262. (withdrawn) The compound of Claim 257, wherein Y is 2-nitrobenzenesulfonamide.

263. (withdrawn) The compound of Claim 257, wherein Y is 9-fluoroenylmethylcarbamate.

264. (withdrawn) The compound of Claim 257, wherein X is benzylcarbamate, R_5 is NR_2X, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

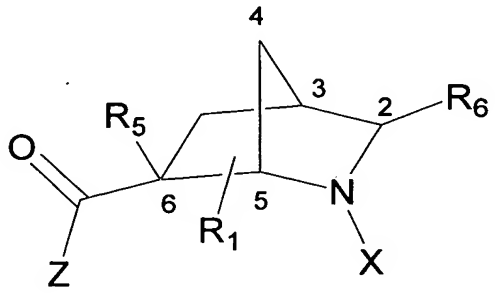
265. (withdrawn) The compound of Claim 257, wherein R_1 is an alkene.

266. (withdrawn) The compound of Claim 257, wherein R_1 is a protected carboxylate.

267. (withdrawn) The compound of Claim 257, wherein R_1 is a protected alcohol.

268. (withdrawn) The compound of Claim 257, wherein R_1 is a protected thiol.

269. (withdrawn) A compound having the formula



(23)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4, 5 or 7;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2Y;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at the positions 2, 3, 5 and 6, and of the carbon bearing R_1 (if R_1 is not H) can be any of the 32 combinations of (R) and (S).

270. (withdrawn) The compound of Claim 269, wherein R_5 is N_3.

271. (withdrawn) The compound of Claim 269, wherein R_5 is NR_2Y.

272. (withdrawn) The compound of Claim 269, wherein Z is OMe.

273. (withdrawn) The compound of Claim 269, wherein X is benzylcarbamate.

274. (withdrawn) The compound of Claim 269, wherein Y is 2-nitrobenzenesulfonamide.

275. (withdrawn) The compound of Claim 269, wherein Y is 9-fluoroenylmethylcarbamate.

276. (withdrawn) The compound of Claim 269, wherein X is benzylcarbamate, R_5 is NR_2Y, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

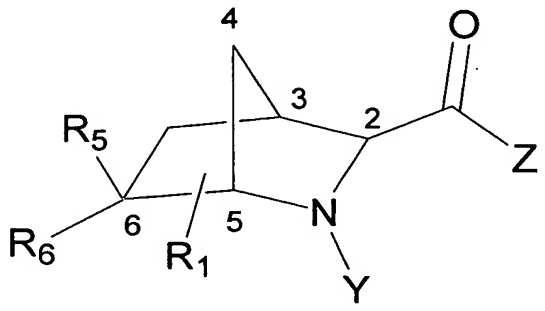
277. (withdrawn) The compound of Claim 269, wherein R_1 is an alkene.

278. (withdrawn) The compound of Claim 269, wherein R_1 is a protected carboxylate.

279. (withdrawn) The compound of Claim 269, wherein R_1 is a protected alcohol.

280. (withdrawn) The compound of Claim 269, wherein R_1 is a protected thiol.

281. (withdrawn) A compound having the formula



(24)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4, 5 or 7;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2X;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at the positions 2, 3, 5 and 6, and of the carbon bearing R_1 (if R_1 is not H) can be any of the 32 combinations of (R) and (S).

282. (withdrawn) The compound of Claim 281, wherein R_5 is N_3.

283. (withdrawn) The compound of Claim 281, wherein R_5 is NR_2X.

284. (withdrawn) The compound of Claim 281, wherein Z is OMe.

285. (withdrawn) The compound of Claim 281, wherein X is benzylcarbamate.

286. (withdrawn) The compound of Claim 281, wherein Y is 2-nitrobenzenesulfonamide.

287. (withdrawn) The compound of Claim 281, wherein Y is 9-fluoroenylmethylcarbamate.

288. (withdrawn) The compound of Claim 281, wherein X is benzylcarbamate, R_5 is NR_2X, R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is –OMe, and R_6 is a carboxylic acid.

289. (withdrawn) The compound of Claim 281, wherein R_1 is an alkene.

290. (withdrawn) The compound of Claim 281, wherein R_1 is a protected carboxylate.

291. (withdrawn) The compound of Claim 281, wherein R_1 is a protected alcohol.

292. (withdrawn) The compound of Claim 281, wherein R_1 is a protected thiol.

293. (withdrawn) A synthesized *bis* peptide made by the method of Claim 169, where the number of amino acids in the peptide, whether naturally occurring or *bis* amino acids, is less than 500.

294. (withdrawn) A synthesized *bis* peptide made by the method of Claim 171, where the number of amino acids in the peptide, whether naturally occurring or *bis* amino acids, is less than 500.

Claims 295-300 (canceled).

301. (new): The compound of Claim 1, where the spiro-ladder oligomers contain no freely rotating bonds within their core structure of bis-amino acid building blocks and diketopiperazine ring linkages, making them useful scaffolds for biomimetic and nanotechnology functions.

302. (new): The compound of Claim 1, wherein the building blocks are nanoscale molecular building blocks, where the building blocks can be folded to create molecular host cavities because they contain no freely rotating covalent bonds within the main body core structure, and where the molecular building blocks are linked together to create spiro-ladder oligomers.

303. (new): The compound of Claim 1, wherein the compound can be coupled through pairs of bonds to create bis-peptides, providing building blocks that can be assembled into discrete shapes.